# MOORE LAKE
# LAKE MANAGEMENT PLAN

## REVIEW AND ASSESSMENT REPORT
## MARCH, 1987

Prepared For: Improvement District #18(S)
Prepared By : Alberta Municipal Affairs

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# 1. INTRODUCTION

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## 1.1 Planning Process

The Moore Lake Review and Assessment Report contains a detailed analysis, interpretation and evaluation of the resource information contained in the Background Report. Based upon this review, conclusions can be drawn, identifying the lake's capacity and capability to permit future development. Once this step is completed a future development plan can be prepared. This plan will identify not only the best possible land uses but also established initial policy statements. This information will then be utilized as the basis for the final area structure plan.

To effectively analyze the Background Report and formulate a future development plan, the following information was reviewed:

1. Physiographic and biophysical capacities and constraints;
2. Socio-economic factors and the demand for recreational areas; and
3. Management goals and objectives.

The first criteria involves a detailed analysis of the natural resource characteristics of the planning area. It requires identification of those areas physically suitable or unsuitable for future development. The topography, soil structure, watershed, water quality and fish and wildlife habitats all affect the capability of the lake environment to support increased development.

The second criteria identifies the socio-economic factors which could affect future lake development. Existing land uses and development, property owner attitudes and perceptions, transportation networks, public accessibility and future demand for recreational facilities all play an important role in determining the future use of the lake.

The third criterial focuses on the identification of the management goals and objectives. This determines the overall future role Moore Lake will play in the recreational development of the Lakeland Region.

A development plan was then prepared. This plan reflects the various physical, biological and social development constraints and capabilities as well as the overall management goals and objectives. From this plan an eventual area structure plan will be prepared and adopted.

To assist in the planning process, a planning committee was established. The committee consisted of representatives from the Improvement District, property owners, lease holders and as required, affected government agencies.

## 1.2 Purpose

In summary, the purpose of the review and assessment report is to analyze the existing information provided in the Background Report. The report is based upon an identification of the suitability for residential, recreational, conservation, agricultural, and resource development. A development plan can then be prepared which addresses both the capabilities and constraints of the planning area and the demand for future development. This report and the development plan will be used as the basis for further discussion and involvement by the Improvement District, property owners, the general public and affected government agencies in the preparation of the final area structure plan.

# 2. RESOURCE ASSESSMENT

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## 2.1 Introduction

Both the physiographic and biophysical characteristics of the planning area need to be analyzed with a view towards determining the lake's capability to support future development. The physiography section includes an analysis of the topography, soils, water tables and drainage patterns. The biophysical section includes an analysis of important fish and wildlife habitats as well as the lake's water quality.

## 2.2 Physiography

### 2.2.1 Slopes and Soils

The slope of the land and existing soil characteristics play a major role in identifying developable areas, specifically the physical capability of the area to withstand on-site sewage disposal, road and building construction and intensive recreational activities. Problems of erosion, poor and excessive soil permeability and the potential for groundwater and lake contamination from residential or recreational development can severely restrict developable areas.

The planning area was divided into four physiographic units, (refer to Map 1) identified through an evaluation of the physical characteristics[1]. Average slopes are predominantly within the gently undulating category (0-10% slope)

and are considered to be suitable for residential, recreational or road development, (refer to Map 2). Smaller areas of moderately rolling slopes (10-15%) exist along the north and southeastern shoreline. In these areas, development of any type, including lake access, would be restricted by steep shoreline banks and rough backshore terrain. Further, soil erosion caused by widespread vegetation clearing could result in excessive surface runoff and slope destabilization.

The predominant soil type is a moderately well-drained loam of glacial till origin. Identified by the La Corey soil series, these soils generally pose no serious development constraints. There are, however, specific areas where existing soil properties could restrict future development[2].

Along the western and southern shoreline the existing sandy soils are very rapidly drained. Development problems associated with sewage disposal and shoreline erosion could restrict the type of activity permitted in these areas. There is also extensive marshland along the western shore and backshore area. The high water table, standing water and very poor drainage in these areas results in severe limitations for all development.

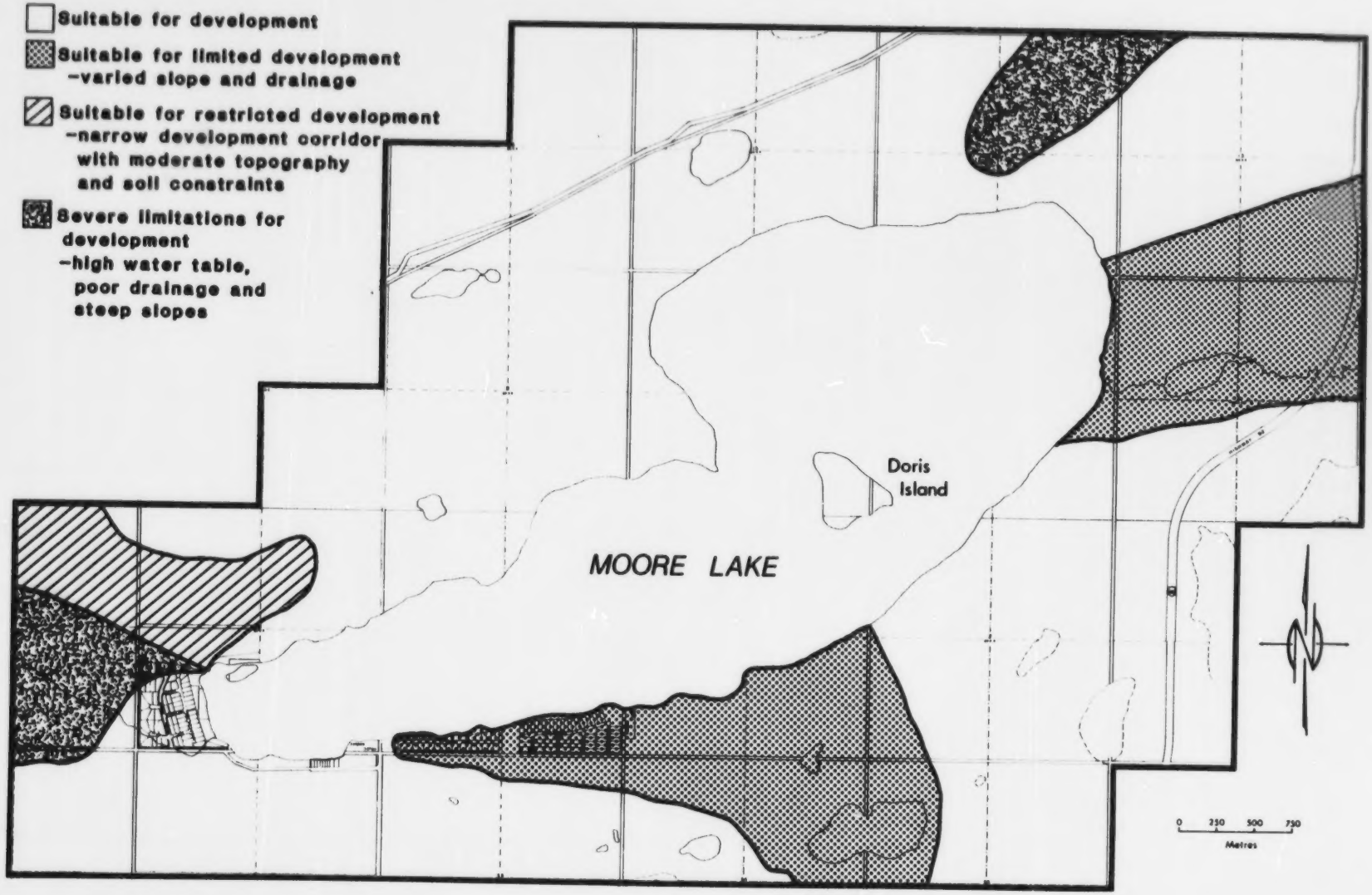
Generally, the topgraphic and soil characteristics do not appear to prohibit future development. Map 1, however, has identified the western section as having severe limitations for development due to the marsh land. No development of any sort should be permitted in this area. Other areas have been identified as having moderate limitations suitable for limited or restricted development. Dispersed development and passive recreational activities could be considered. Site specific studies would be required to determine the type and density of development which could be provided in these areas.

[1] It is important to note that physical constraints identified in the planning area must be considered very general and are not intended to be site specific. Intensive on-site investigations would still be required for future development proposals.

[2] Map 2 provides a site analysis for a specific development. Road construction is primarily determined by physiographic characteristics.

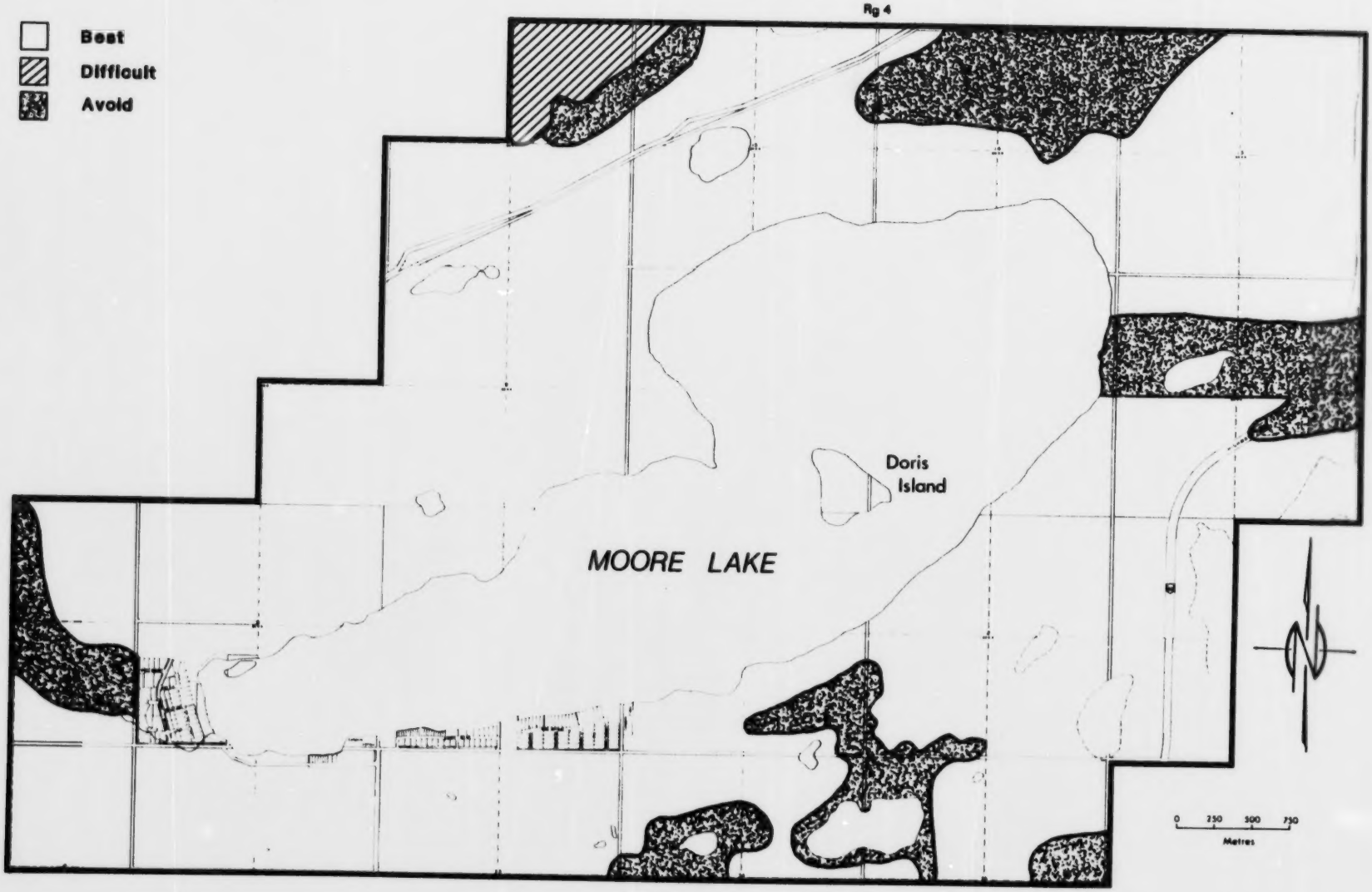
## Map 1

## PHYSICAL LAND ASSESSMENT



## Map 2

## ROAD BUILDING SUITABILITY



### 2.2.2 Ground Water Supplies

With the possibility of increasing recreational and residential development (both permanent and seasonal), lake users will require a sufficient local potable water supply. The availability of ground water and its chemical content therefore, will have an important effect on the type and location of future development.

Existing ground water supplies in the planning area have been estimated to be in the range of 25 – 100 imperial gallons per minute (igpm). Based upon Alberta Environment's set development standards requiring 240 imperial gallons per day per residence, it can be assumed that ground water supplies should be able to accommodate most types and intensities of development. Water quality studies also indicates that potability would not be considered a limiting factor to future development.

### 2.2.3 Lake Levels

Fluctuating water levels were identified by the land owners as a major development concern. This issue directly relates to the possibility of oil companies using Moore Lake as a water source to develop existing oil sands leases in the planning area. Esso Resources and other oil companies have, however, indicated that no water from Moore Lake would be required to operate future heavy oil sands projects. Alberta Environment notes that no water withdrawals will be permitted on Moore Lake until detailed studies have been undertaken to demonstrate that preferred lake levels and downstream flows will be maintained. Meanwhile, they further indicate that future fluctuations will result from precipitation and the building or removal of beaver dams in the watershed.

### 2.2.4 Historical/Archeological Factors

Moore Lake is included in an area of the Lakeland Region that is designated as having a high potential for archeological and historical sites. Alberta Culture has indicated that all future developments should be carefully evaluated and in some cases Historical Impact Assessments could be required prior to any surface disturbance. The developer would be responsible for conducting such an assessment in areas where the proposal would either destroy or alter historic resources. Written approval from the Archaeological Survey should be received by the developer and submitted to the Development Control Officer before a development permit is issued. In this manner the loss of any historical/archaeological resources could be minimized.

### 2.2.5 Bathymetry

The type of development and the intensity of use which could be permitted is partly determined by the lake depth and shape. The following is a summary of the lake's shape and slope characteristics:

1. Areas of gentle shoreline slopes, sandy beaches and minimal aquatic vegetation provide excellent recreation areas. Areas with steep shoreline gradients and a rocky or vegetation covered beach, limit recreational potential. Map 3 identifies the areas on Moore Lake which are classified as having existing or potential recreational capabilities.
2. The shallow western basin of Moore Lake inhibits excessive boating/waterskiing. Congestion and serious disruption of the fish and wildlife habitat along the northwest shoreline could occur as a result of overuse. The shallowness also precludes future development which could increase the nutrient loading of the water.
3. Doris Island separates the two basins and is considered to be a navigational hazard. Dense vegetation growth around the island serves as both a deterent to power boating and waterskiing and an attraction for fishermen. Power boating in this area should be prohibited for safety reasons as well as to protect existing fish habitats.
4. Map 3 indicates several sites where boat launching/docking facilities could be built. The gentle shoreline and unimpeded beach sites provide excellent areas for boating facilities.
5. The northern shoreline along both the east and west basin is characterized by a steep water's edge, rolling to undulating backshore and rocky beach areas. This strip of land is not considered suitable for any development.

Despite the areas mentioned, the overall depth, shape and size of Moore Lake provides numerous sites suitable for boating and beach activities, (refer to Map 3).

## 2.3 Biophysical

### 2.3.1 Water Quality

A review of the existing trophic state[1] of Moore Lake is required to estimate the carrying capacity of the lake for future development. In this case the carrying capacity is defined in terms of the biological sensitivity of the lake to withstand existing and future development pressures.

Data gathered by Alberta Environment indicated the following characteristics[2]:

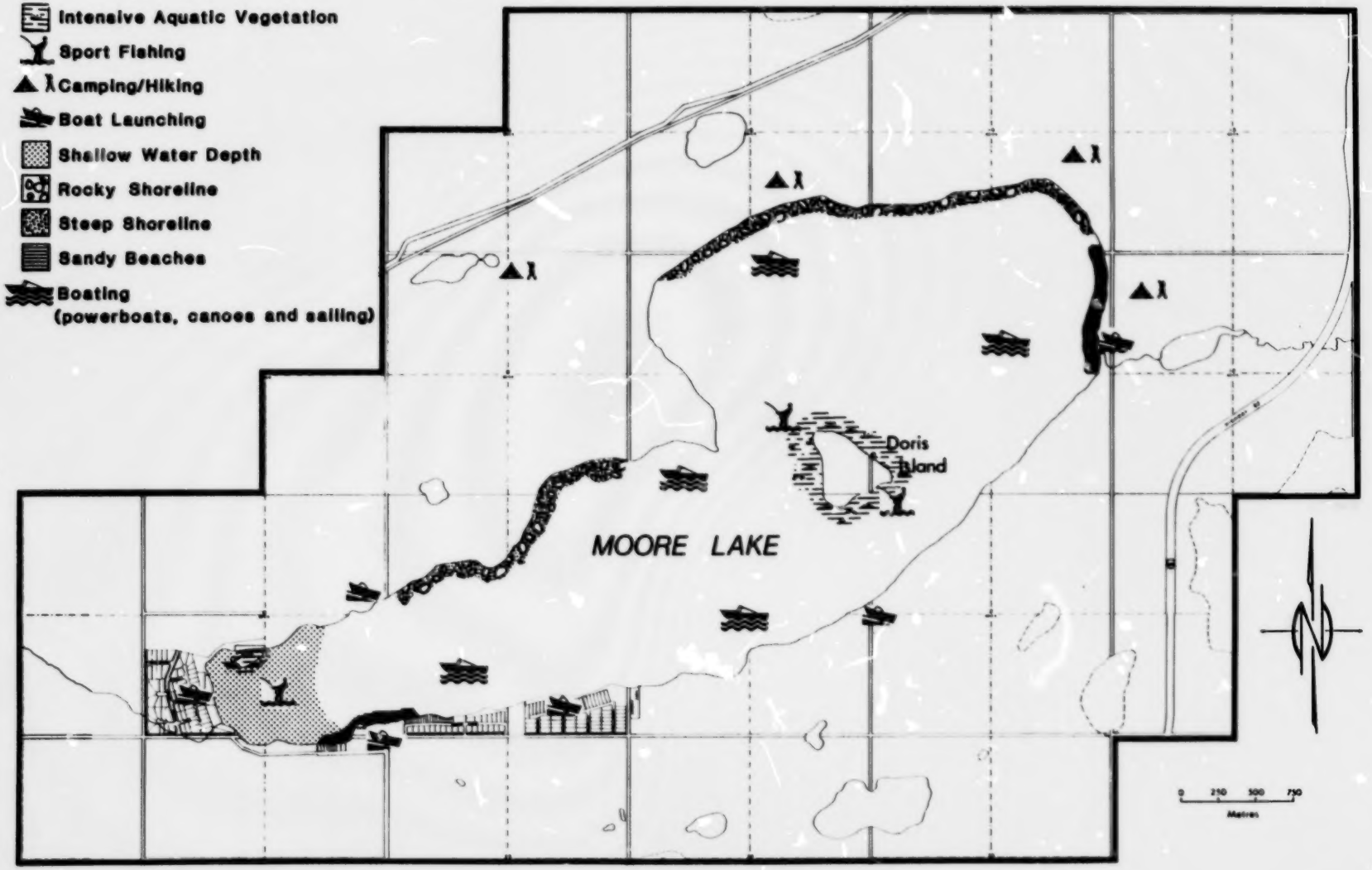
1. Moore Lake is considered to be a meso-eutrophic or moderately fertile lake. Good water quality is usually equated with meso-eutrophic conditions;
2. Drainage flows from the NW to the SE with limited inflow and outflow channels. Almost eightly percent of the total annual inflow comes from precipitation and subsequent surface run-off. The annual outflow is less than ten percent of the total inflow and the water retention time within the lake is 13.6 years. Consequently the flushing period is extremely low (.01 years);
3. The existing watershed is essentially undeveloped, covered with extensive stands of aspen and pines.

[1] The trophic state of a lake is determined through an assessment of the various physical, chemical and biological characteristics and relates to the total nutrient loading in the water. Increased nutrient loading results in algae blooms, excessive aquatic plant growth, smelly or cloudy water and detracts from the overall enjoyment of lake use.

[2] A Trophic Assessment of Nine Lakes in the Cold Lake Region, Alberta Environment, Water Quality Control Branch, 1981.

## Map 3

# ASSESSMENT OF RECREATION POTENTIAL



Future development could have a major impact on the existing water quality by increasing the nutrient loading of the Lake. The greatest potential for change would result from development in the watershed. The majority of nutrients entering the lake are derived from the watershed as surface run-off. Clearing the existing vegetation for oil or gas well sites, pipelines, access roads, campgrounds, parking lots and/or residential subdivisions could result in uncontrolled surface run-off and disruption of surface water drainage[1]. It would also increase the possibility of further nutrient loading due to accidental oil spills and improperly operating sewage disposal systems.

This problem is exacerbated by the fact that Moore Lake has an excessively long water retention period. The poor outflow has resulted in a poor flushing time and the lake requires extensive cleaning periods. Whatever nutrients enter the lake will likely remain for over 13 years.

The potential for problems created by watershed clearing is particularly evident within the north and northwestern sections of the planning area. In these areas land clearing and development could result in excessive amounts of nutrients entering the lake through surface run-off.[2] It is imperative that lands within the northern watershed be maintained in their natural state.

The western basin is also extremely sensitive to environmental changes. The high water table and wetland conditions should preclude any future development due to the potential for lake water contamination. Shoreline disturbance could easily increase the nutrients entering the lake resulting in increased aquatic vegetation growth and overall oxygen depletion. As this area is the most important fish habitat on the lake, increased nutrient levels could effectively destroy the fish population.

The large lake surface and existing good water quality suggests that while further development might be accommodated, the shallow western basin and the slow flushing period indicate the potential for serious environmental deterioration. Based on this assessment, Moore Lake appears capable of supporting only limited and geographically restricted development.

### 2.3.2 Wildlife Habitat

While the area is inhabited by a wide diversity of wildlife species, it is not considered to contain important staging or production habitats. The lack of significant marshland or extensive areas of aquatic vegetation, restricts the development of shoreline habitat for waterfowl. The poor distribution of land forms and low soil fertility in the backshore also provides little habitat protection or feeding grounds.

The large areas of undeveloped, forested lands and the low level of human population, however, does provide numerous habitats for shorebirds, white tailed deer, fur bearers (especially beaver) and the occasional bald eagle or osprey (on Doris Island). Map 4 outlines those areas on the lake which are considered important wildlife habitats. The northwestern shoreline is considered to be a prime waterfowl and shorebird habitat. This area contains significant aquatic vegetation growth utilized for nesting, protection and feeding. The northeastern area of the backshore also provides important ungulate feeding and migratory habitats. Finally, the undisturbed environment on Doris Island provides a haven for most shorebirds and alternatively is used as a nesting site for eagles, osprey or blue heron.

Current development has had a limited impact on existing wildlife. All of the habitats could, however, be disrupted or lost if substantial clearing of either the forested lands or the aquatic vegetation occurred.

[1] Alberta Environment indicates that nutrient loading from a watershed may increase three to five-fold per unit land area as a result of clearing. Forested areas, particularly evergreen forests, may intercept one-third to one-half of annual precipitation.

[2] Alberta Environment notes that activities associated with residences (permanent or seasonal) e.g. road construction vegetation clearing, basement construction, may contribute ten times more nutrients that forested land. The clearing of vegetation eliminates interception of precipitation and results in increased surface run-off the therefore increases erosion, sedimentation and nutrient loading.

### 2.3.3 Fish Habitat

Moore Lake is not considered to be an important sport fishing lake. The lack of significant areas of emergent or submergent aquatic vegetation has resulted in poor fish spawning and feeding areas. Future development, however, should be carefully reviewed in terms of the potential for deterioration of the existing fish populations.

According to regional fisheries biologists, areas of submergent and emergent aquatic vegetation provide suitable spawning grounds for northern pike and perch. Lake areas containing sand/gravel beach areas are best suited for spawning of whitefish and walleye. Lake inlets and outlets are also suited for spawning of northern pike, perch and walleye. Map 4 identifies those areas which have been confirmed as major spawning and feeding areas. The western basin of Moore Lake is considered to be the best area on the lake for fish habitats. The substantial growths of emergent and submergent aquatic vegetation and shallow lake depth provides an excellent combination of feeding, spawning and protection grounds. Most of the eastern basin also provides good fish habitat, especially around Doris Island. Happy Hollow Lake, north of Moore Lake is also identified as an important fish habitat as it is here that Fish and Wildlife have stocked Rainbow Trout. The success of maintaining or enhancing existing fish populations in Moore Lake appears to depend upon the protection of these sites.[1]

There are two important environmental effects which could threaten the existing fisheries; nutrient loading and lakeshore and lakebed disturbances. These include the removal of aquatic vegetation for boating or beach enhancement and increased soil erosion resulting from shoreline development. This is an important concern respecting development along the western basin. Excessive nutrient loading and subsequent deterioration of the lake water quality results from erosion and runoff from cleared land and improperly treated sewage. This contributes to algae growths and when this extra organic material dies and decays, the extra nutrients increases oxygen depletion (eutrophication) in the water and the fish die[2].

It is difficult to specifically determine how much of the existing fish habitats can be lost before the fish population is significantly reduced. However, because Moore Lake currently contains poor fish populations, it is important that land use planning consider the importance of existing habitats.

## 2.4 Summary and Conclusion

Land and water related resource characteristics are important factors in identifying the lake's development potential and limitations. Maps 1-4 graphically summarizes the various constraints and capacities as well as the recreational potential. These will play an important role in determining future land uses. Overall limitations are not widespread but in many areas are compounded by more than one constraint.

Based upon the assessment of the physical and biological features, the following conclusions are provided:

(a) There are two very important areas on the lake where significant growths of emergent and submergent aquatic vegetation occur. These areas are considered essential for fish spawning and feeding. Their removal for recreational activities or their destruction from adjacent shoreline development could seriously jeopardize future fish stocks in the lake. Happy Hollow Lake should also be protected.

(b) Lake water quality is by far the most limiting constraint to development. Future development should not result in deterioration of the water quality and must be carefully planned.

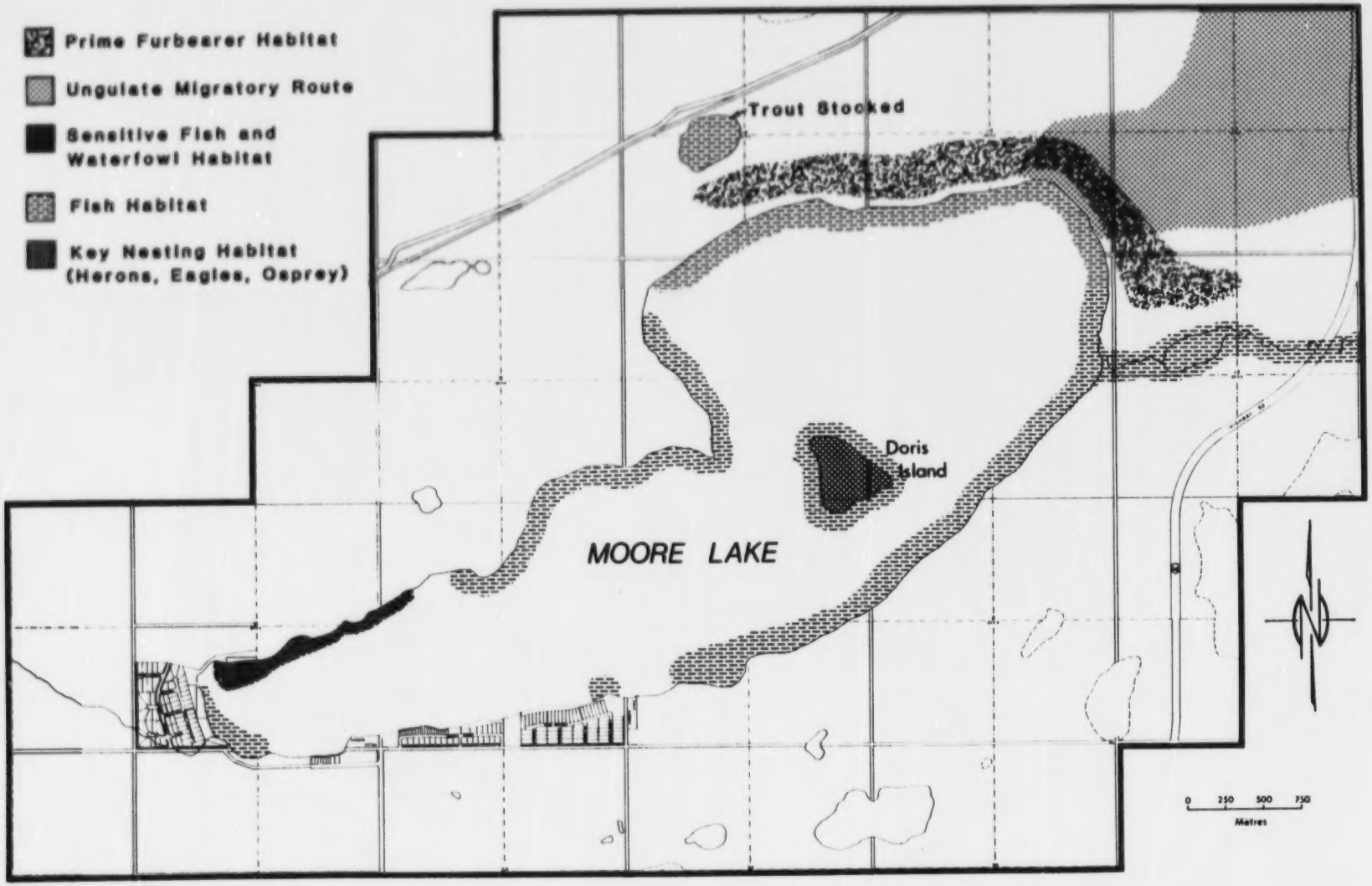
(c) Much of the planning area, including the shoreline, is physiographically suitable for development. However, the existing marsh land in the western area would severely limit future development. Smaller areas along the south and eastern shoreline contain poor soil drainage properties that preclude most types of development. The steep slopes along the northern shoreline would also preclude accessibility for intensive recreation activities.

[1] The regional fisheries biologists note that all of the lakeshore/lakebed areas are in some ways important and that the indication of the known and suspected spawning areas do not detract from the importance of other lake areas where foraging, hiding, loafing, etc. can occur.

[2] Any deterioration of the oxygen levels in the lake could have a significant impact on the lake whitefish populations which characteristically prefer well-oxygenated areas.

## Map 4

# FISH AND WILDLIFE HABITAT ASSESSMENT



# 3. SOCIO-ECONOMIC FACTORS

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## 3.1 Property Owner Survey

### 3.1.1 Introduction

An analysis of the property owner questionnaire and input from the Planning Committee helped to identify significant issues and concerns. User satisfaction, perceived levels of development and concerns respecting the quality and quantity of development are valuable indicators of the type and level of development acceptable on the lake. The following is a summary of the reactions, concerns, perceptions and issues identified by the respondents[1]. These aided in the identification of lake management goals and objectives.

### 3.1.2 Lake Use

A majority of the respondents indicated some problems with Moore Lake for recreational use. The major complaints were the poor to fair fishing and weed problems along the shoreline. Problems of water level fluctuations and algae growth were also noted. A strong majority of the respondents indicated that the water quality of Moore Lake was good to excellent.

The property owners were also asked to comment on the level of use during average and long weekends. Almost all of the respondents believed that beach and lake use was moderately to heavily used at all times.

### 3.1.3 Lake Facilities

There was only one major concern with the existing municipal infrastructure; over half of the respondents identified poor roads as a lake development issue. Most of the respondents, however, indicated that existing beach facilities, boat launching facilities and public recreation areas adequately served their recreational needs.

Moore Lake contains two provincial park sites and two private campgrounds, each with lake access and boating and swimming facilities. These sites are extensively utilized by day users and overnight campers during the summer months. The landowners on the lake have responded to this use by indicating that the lake and beaches are overcrowded.

### 3.1.4 Effects of Resource Development

Approximately two-thirds of the respondents felt that oil development activity in the Cold Lake Region had not affected the recreational value of their site. The most common complaint was that the increased oil activity had led to overcrowding on the lake.[2] Several respondents, however, noted that the smell from the oil projects did have a negative effect on land and residential use. There was also concern noted that continued oil development in the area could result in lowered water levels and the possibility of lake contamination from an oil spill. A number of the respondents felt that past industrial development had increased the value of their cottages.

### 3.1.5 Levels of Development

The property owners were also asked how they felt future residential/ recreational development might affect the use of the lake. Approximately half of the respondents, fearing lake overcrowding, indicated that their should be no further development of any kind.

Only a quarter of the respondents indicated support for future development noting that it should provide better municipal services.

[1] Refer to the Background Report for a complete print out of the survey results and a breakdown of individual responses and opinions. Survey results are based on a response rate of 60%, (135 surveys mailed, 80 returned). The members of the Planning Committee reiterated these findings and their opinions are offered throughout.

[2] This response probably reflected the use of the campgrounds by "live-ins"; transient oil workers who would set up a permanent campsite and live there year round.

The property owners were also asked what effect permanent residential development around the lake could have on their cottage use. A large majority of the respondents, perceived no negative impacts indicating it would help create a community atmosphere. The most common concerns were the possible destruction of the natural setting of the area and the problems of increased traffic, noise, pollution, dust and vandalism.

Finally the property owners were asked whether commercial services such as a convenience store, or a gas station were desirable in a resort development. Approximately three quarters of the respondents indicated no objection noting that it should be well planned with strict controls. Among those who indicated that commercial services were not appropriate at the lake, a majority expressed the concern that commercial uses would destroy the natural atmosphere of the area and would result in increased vehicular traffic and increased lake use.

### 3.1.6 Summary and Analysis

Based on an overall analysis of the questionnaire response and in particular the "written-in" comments, it is possible to identify the significant conflicts, problems and concerns of the property owners. The majority of respondents and the Planning Committee are generally satisfied with the existing environmental qualities and levels of development of Moore Lake. The most common complaint refers to the problem of water quality and improperly operating sewage disposal systems. The respondents have expressed their opinion that specific and enforceable regulations are required to control illegal sewage discharge into the lake. Almost half of the written responses noted this particular issue.

There was also considerable concern expressed by the respondents and the Planning Committee over permitting future development. It was felt that the result would be total deterioration of the water quality and a general deterioration of the overall recreation value of Moore Lake. Most property owners stated that Moore Lake simply could not accommodate more development.

## 3.2 Existing Land Uses

### 3.2.1 Current Development

To assess the impact of future development it is necessary to measure current levels of development, its type and distribution.

One method of assessment is to compare the number of existing residential subdivision lots in the planning area with the total water surface of the lake. This method assumes that for every residential lot, 4 ha of surface water is required for "full recreational enjoyment"[1]. Overcrowding may occur where less than 4 ha of water surface is available.
At Moore Lake there are 180 registered subdivision lots, 70 of which contain an existing development. Considering only the number of developed lots, 14 ha of lake surface area is available for each user (lake surface area ÷developed lots) However, if all available lots were to be developed, this figure drops to 5.46 ha per user (refer to Table 1). From this analysis, it appears that Moore lake is approaching an overcrowded situation and as the balance of registered lots are developed, overall lake use will double.

[1] Methodology utilized by Alberta Municipal Affairs

## TABLE 1
## Existing Development

| Lake Surface Area | Registered Residential | Residential Lots Developed | Developed Capacity | Shore Lots |
|---|---|---|---|---|
| 986ha | 180 | 70 | 39% | 42% |

| Shore Lots Developed | Lake Surface Area Per Registered Lot | Lake Surface Area Per Developed Lot |
|---|---|---|
| 61% | 5.46 ha | 14 ha |

Another method of assessing impact is to consider use of the lake outside the existing subdivisions. This refers to day/overnight use of the public and private recreation facilities. To assess the impact, it is necessary to measure user days[1].

A total of 8 cabins and 10 recreational vehicle sites are available for rent at Happy Hollow Resort and 4 cabins and 15 camping sites at Bodina Resort. Assuming an average of 3.3 persons per party and full occupancy, approximately 122 lake users would be generated per day[2].
Day users, campers and picnickers utilize the two existing provincial campgrounds. In total there are 60 unserviced sites. Assuming the same average of 3.3 persons per party, approximately 198 day users are generated per day.

The measurement of user days can also relate to the existing subdivision lots. With an average 3.3 persons per lot, the number of lake users would be 3.3 x 70 = 231 persons per day. Assuming all of the existing lots will be developed, total use levels can be expected to reach 3.3 x 180 = 594 users per day. The difference between existing and potential use levels on Moore Lake is very significant. Peak use from residential lots will, therefore, increase substantially when all existing lots are developed.[3]

An estimate of total daily use (long weekends at full capacity), can then be calculated. This calculation is shown in Appendix B. The results suggest that on a long weekend, assuming full occupancy, approximately 581 people use Moore Lake. By dividing the total lake surface area (986 ha) by the number of users, an estimate of lake use density can be calculated. Present use levels would yield a ratio of 1.7 ha/user. When all existing lots are developed the ratio will decrease to approximately 1 ha/user[4].

[1] A user day refers to the impact made by one lake user during one day. Present use levels were calculated for full occupancy of rental cabins and public camping facilities (based on long weekend use) and were identified through field research, input from the planning committee and from Alberta Recreation and Parks. Full occupancy relates to a long weekend during the months of July and August. A breakdown of average summer use is provided in Appendix A.

[2] Based on Alberta Recreation and Parks methodology approximately 3.3 persons per party is the provincial average for each day use/camping facility.

[3] Bodina Resorts has indicated their desire to double the number of rental campground sites to 30. This will further increase user days.

[4] In comparison, Marie Lake has a ratio of 7.73 ha/user.

If a similar calculation is made using the number of residential lots/recreational sites, an estimate of the total lake density can be established. The existing number of residential/recreational units is assumed to be at least 176[1]. Given that the lake surface of Moore Lake is 986 ha, each unit has 5.6 ha of lake surface available for use. When all existing lots are developed the ratio will decrease substantially to 3.27 ha/unit.

The pattern of development on Moore Lake also plays a major role in identifying the impact of future development. All of the registered subdivision lots occur within the west basin. In this area, it was previously noted that the shallow water and excellent fish and wildlife habitats make it very sensitive to overdevelopment. The continued development of the vacant lots will increase the potential for environmental damage in this area. It will also result in boat congestion, conflicts between boaters and swimmers and conflicts between property owners and day users. Assuming that this west basin contains approximately 177 ha, the density calculations may be considerably higher[2]. The density ratio for the west basin alone can be calculated as 1 ha/user. Therefore, it can be concluded that Moore Lake may already be overcrowded.

Utilizing the fact that overcrowding is perceived to occur once the unit density is reduced to approximately 4 ha/unit it can be determined that Moore Lake is rapidly reaching an overcrowding state[3]. The figures also illustrate that total lake use could double without permitting additional residential or recreational development.

### 3.2.2 Municipal Reserves

Municipal reserves on Moore Lake amount to 7.5 ha and 3.4 ha of environmental reserves (including 3.88 km of shoreline). This land exists within the registered residential subdivisions and resulted from the subdivision process. No municipal development has occurred. Background research has indicated that the reserve lands are primarily used by the adjacent lot owners with little or no outside public use. The reserves are not marked and they provide only limited public access to the shoreline.

[1] This figure does not include day users who might only use the existingboat launching facilities and do not set up camp at any of the available sites. No estimation is available from this report. The figures used in this assessment are provided in Appendix B.

[2] It should be pointed out that based on the past experience of Alberta Municipal Affairs, the incidence of complaints regarding overcrowding and over-use of the lake will accelerate once the user density is reduced to approximately 4 ha/unit. Therefore, if development at Moore Lake reaches 246.5 recreation/residential units (986 ha÷4 ha) then it is very likely that a majority of the lake users would complain about overuse and overcrowding.

[3] Obviously all of the users will not remain in the west basin but the fact that access only exists to this area means that overcrowding is highly probable. The unit density in the west basin would be 177 ha÷176 units = 1 ha/user. The potential unit density would be 177 ha÷301 units = .59 ha/user.

### 3.2.3 Boat Use

Assessment of the potential recreational use of the lake for boating involves identification of the boat density capacity. This compares the number of boats utilized by the existing property owners and recreational users with the amount of water surface available for boating[1]. On average 4 ha of surface water is required per boat to avoid congestion[2]. On Moore Lake, there are estimated to be no more than 83 boats and each boat would have approximately 10 ha of lake surface. These boats represent 41% of the lake's total boating capacity. This suggests that Moore Lake would be able to accommodate the type of future development which would generate additional boating activities. Even if all the vacant lots were developed and approximately 80% of the lake's boating capacity were realized, Moore Lake still appears to be able to support increased boating activities. Table 2 outlines the data utilized in this assumption. (See Appendix B for further explanation).

Table 2
Boat Use

| Boats Operated By All Property Owners | Boats Operated from Private Campgrounds | Boats Operated By Agricultural Farm sites | Boats Operated from Provincial Parks |
|---|---|---|---|
| 56 | 9 | 3 | 15 |

| Total Boats Operated by Day Users | Lake Surface Area for Boating | Surface Area Available for each Boat | Potential Boat Use | Surface Area Available |
|---|---|---|---|---|
| 83 | 832 ha | 10 ha | 157 | 5.27 ha |

While it has been identified that Moore Lake is being utilized to 41% of its boating capacity, this calculation is not necessarily the most critical determinant. The type of boating (fishing, waterskiing, leisure boating), the lake surface roughness, patterns of localized boating and lake shape and depth are also important factors in identifying capacity.

Generally, the overall size and shape of Moore Lake is not conducive to intensive amounts of boating and water skiing activities. The presence of Doris Island, the shallowness and extensive areas of aquatic vegetation within the west basin, greatly inhibits motorized boating. Excessive amounts of boating in these areas could create navigational and environmental problems. The eastern basin is much more suitable for boating activities and except for the northern shoreline, boat launching/docking facilities could easily be accommodated. The problem is the lack of public road access.

Boating pressure from existing developments appears to be less than the lake's capacity to accommodate increased use. However, comparing boating concentrations and overall development potential, it would appear that Moore Lake has a limited capacity to permit increased boating activities. Congestion in the west basin could result in both navigational and environmental problems.

[1] The water surface area of Moore Lake available for boating was determined by eliminating areas of extensive aquatic vegetation along the shoreline as well as areas less than 2 m in depth from the total lake surface area. On Moore Lake the surface area available for boating is approximately 828 ha.

[2] Alberta Recreation and Parks methodology.

## 3.3 Transportation

The existing transportation network serving Moore Lake has a major influence on any future development. Moore Lake does not have a road system that provides public access to potentially developable areas.

Along the western shoreline a well-developed government road allowance does provide access to the residential subdivision. This road, however, does not circumvent the lake and access is restricted to the developed areas. Development outside this area would require new roads and utility services. Roads are expensive (both in terms of construction and maintenance) and in the case of most of the undeveloped areas, perhaps cost prohibitive. The Improvement District and the M.D. of Bonnyville determine the priority for improved access and overall municipal requirements will influence final project selection and funding. Future development plans must, therefore, recognize the potential constraints imposed by limited access.

## 3.4 Municipal Administration

Moore Lake is located within the municipal administrative boundaries of Improvement District No. 18(S) and the M.D. of Bonnyville #87.

### 3.4.1 Improvement District #18(S)

The Advisory Council for the I.D. has adopted both a Land Use Order and a Land Use Strategy which affects all development on private or Crown lands. Within the Land Use Order the planning area is zoned as Rural District which permits the following as discretionary uses only:

- 1 country residence or farmstead separation (maximum lot size is 2-4 ha);
- intensive recreational uses for high density recreational activities (campgrounds, hotels etc);
- extensive recreation uses for passive recreational activities (non-facility oriented activities).

For these uses the following provisions apply:

- a 30 m buffer zone is to be provided from the shoreline of any waterbody. No structures of any kind shall be permitted within this strip.

The Land Use Strategy, which was adopted by the Advisory Council as a general policy framework for land uses, also provides development guidelines. It serves as both a guide and reference for other government departments and agencies whose actions may influence land use and development in the I.D. Within the Strategy the following districts are identified and policies provided:

- recreation and open space;
- transportation and utility facilities;
- resource extraction;
- country residential; and
- environmentally sensitive areas.

The Strategy and Land Use Order identified local land use issues and concerns and provided goals and specific policies to deal with development proposals. In the case of Moore Lake, these goals and policies have a major impact on all future development.

### 3.4.2 M.D. of Bonnyville No. 87

The M.D. of Bonnyville has adopted both a Land Use Bylaw and a General Municipal Plan. That portion of the Moore Lake planning area within the M.D. boundaries is principally zoned as Agricultural District. This District permits one country residential or farmstead parcel per unsubdivided quarter section. Intensive recreational uses are also permitted as a discretionary use. The balance of land, identified by subdivision plan 792 0537 is zoned as Country Residential 'CR1' and Intensive Recreation to accommodate existing uses. These Districts permit multi-lot residential development, camping, picnicking and other recreational uses.

The general provisions affecting all development within the M.D. of Bonnyville are identified as follows:

- the maximum parcel size for a single country residential parcel or farmstead in the Agricultural District shall be 10 acres. For multi-lot country residential development the maximum lot size is three acres.
- The subdivision and development of more than one parcel per quarter section for country residential purposes shall not be approved until such time as the subject parcels have been reclassified to the Country Residential District – 'CR'.
- Developments shall be required to install adequate on-site water supply system and sewage disposal systems which have been approved by the authority having jurisdiction. Such systems shall be of sufficient size to handle the anticipated number of users of the intensive recreation facilities.

The General Municipal Plan was adopted by the M.D. Council in 1985 as a review of existing planning policies and guidelines. A general outline of the important provisions follows:

- no residential development within 30 m of the lake shoreline;
- the developer shall construct boat launching facilities as required and to the satisfaction of the M.D.;
- the developer shall clear and post all walkways to improve pedestrian access; and
- the preparation of an outline plan or area structure plan may be required for any proposed development.

The General Municipal Plan and the Land Use Bylaw must be addressed during the preparation of an Area Structure Plan for Moore Lake. Both documents have provided goals and specific policies to deal with future developments within the M.D. boundaries. Final approval, therefore, of any area structure plan for Moore Lake, should be given by the M.D. of Bonnyville.

### 3.4.3 Alberta Municipal Affairs

The regulation and control of Land throughout the Province of Alberta is contained within the Planning Act, R.S.A. 1980. Private development on Crown Land is also governed by the provisions of this Act, however, Crown agencies and resource development are exempt. Alberta Municipal Affairs is responsible for implementation of the Planning Act, R.S.A. 1980 and in the case of Improvement District #18(S) is responsible for subdivision approvals. Alberta Municipal Affairs is also responsible for the review and assessment of applications for private development on Crown Lands.

The Planning Act, R.S.A. 1980 contains several regulations which affect future planning and development in the Moore Lake planning area. These are as follows:

- minimum lot size for unserviced residential developments is 1,858 sq. m;
- 10% of multi-lot development shall be provided as public/school reserves;
- 6 m environmental reserve strips shall be provided on all lakeshores.

### 3.4.4 Crown Land

As noted in the Background Report for Moore Lake approximately 75% of the land in the planning area is Crown Land, owned by the Province and administered through Alberta Forestry, Lands and Wildlife[1]. It is these large areas of unpatented and leased or reserved lands which hold the key for significant land use changes. The provincial Government appears willing to investigate the possibility of permitting public or private recreation areas on Crown Land with the intent to provide for the increasing demand for greater recreational opportunities in the region. Future development of Crown Lands should reflect the policies and guidelines developed through the preparation of the Lake Management Plan. Alberta Forestry, Lands and Wildlife have indicated their support in the preparation of the lake management plan for Moore lake prior to the issuance of further dispositions.

## 3.5 Recommendations and Conclusions

The attitudes and opinions of property owners, current land uses, boating capacity and accessibility to the planning area are all important factors which must be considered when identifying both the potential for development as well as actual developable areas on Moore Lake.

1. The property owner survey identified the concerns and attitudes of the residents of Moore Lake. Over half of the respondents indicated that the main problem with existing and future developments was the need for better development controls. Poor sewage disposal systems and lack of enforcement was the main concern and the respondents noted that any future development should not result in water quality deterioration. It was also noted that if future development was permitted it should not occur in the west basin. Finally it was indicated that while commercial development on the lake was a good idea, future development should be restricted.
2. It was concluded that Moore Lake is heavily developed along the west basin and that as existing vacant lots are developed, problems of user congestion and environmental deterioration will probably increase.
3. As Moore lake is only developed along the west basin, boating congestion is considered to be a potential problem with increased development. The environmental impact on the fish and wildlife habitats and the navigational hazards from overuse would require boating restrictions.
4. Limited access to the planning area severely restricts future development. The costs of road construction and maintenance will have a major impact on the location, type and density of any recreational or residential proposal. The Improvement District, the M.D. of Bonnyville and Alberta Transportation have indicated that there are no future plans for upgrading or expanding existing roads, or for providing funds for new roads.
5. Existing Provincial and Municipal legislation requires that general land use policies be incorporated into any future lake development plan. It is also important to realize that Crown lands are the key to land and lake changes and that the lake management plan should reflect potential leasing agreements.

It would appear that Moore Lake is reaching its development capacity and that the type of future development permitted on the lake must be reviewed in the context of potential overdevelopment. The limited road access has resulted in a concentration of development along the west basin. In this area the potential for the deterioration of the water quality and fish and wildlife habitats is very high and should be protected. Future development, could be permitted along the east basin where no development has occurred. Attempts should be made, however, to protect the environment of the lake and ensure that future land uses are compatible with existing lake uses.

[1] For a complete breakdown of land tenure within the Moore Lake Planning Area refer to Map 15 in the Background Report.

# 4. FUTURE DEVELOPMENT DEMANDS

# 4. FUTURE DEVELOPMENT DEMANDS

## 4.1 Introduction

There are several factors outside the immediate planning area which may affect future development. These include:

(a) future demand for recreational areas on a regional and provincial scale;

(b) oil development activities and associated regional population growths; and

(c) the regional tourism potential.

It is important to forecast residential and recreational demands and to assess the impact on future lake development.

## 4.2 Recreation Demands

The continued rising standards of living plus increases in disposable income and leisure time appears to indicate that the rising popularity of outdoor recreation, especially intensive recreational activities (swimming, boating, water skiing fishing, etc.) is likely to increase. Further, people are more willing to travel greater distances to avoid overdeveloped and congested lakes.[1] The result has been increased public pressure in Alberta to provide newer recreational facilities as well as greater recreational development opportunities.

The attractive natural qualities of Moore Lake, the availability of public recreational facilities and potential for recreational opportunities has resulted in increased local regional and provincial pressure to increase development of the lake's recreational and residential facilities.

## 4.3 Oil Development

The development of the oil sand leases held by Esso Resources Canada Ltd. and Husky Oil Ltd. could have a considerable impact on the use of the lake and the natural environment. The most immediate effect would result from the indirect effects of site specific land disturbances. Vegetation clearing for well development, service road construction, pipeline and power rights-of-way and the high volumes of industry related traffic on local roads could result in negative effects on the lake's environment. Further, road construction to serve the new well sites could provide public access to areas of the lake which should not be utilized for any shoreline activities.

Moore Lake, due to its proximity to regional urban centres and the large oil sands projects, provides a focus for future recreational and residential development. Increases in the price of energy results in increased regional population growth which in turn increases the demand for regional recreational opportunities. It was noted in the Background Report that during periods of heavy oil sands activity, the two provincial parks were filled to capacity with oil workers who camped there permanently. Overall, development of the regional oil sands deposits will undoubtedly result in increased regional recreational demands.

[1] The Lakeland Tourist Destination Study noted that the major market for tourism in the Lakeland Region will be Edmonton.

## 4.4 Tourism Potential

Moore Lake is currently viewed as a significant regional recreation destination point attracting large number of weekend/overnight users from inside the Lakeland area.

However, in 1985 the Lakeland Tourist Study was completed for Alberta Tourism. The Study represented an inventory of natural, cultural, and physical resources within the area, and further identified recreation/tourism development of opportunities. Moore Lake was identified along with Marie Lake, Cold Lake, Ethel Lake as well as other smaller lakes, as being suitable for the development of commercial campgrounds and public recreation facilities. It was noted that Moore Lake represented a new recreation and tourism destination for all of Alberta.[1]

## 4.5 Conclusion

It is anticipated that local and regional recreational demands on Moore Lake will continue to increase. Furthermore, growth is expected in the recreational development of the lake should opportunities be allotted. It is, however, anticipated that the demand for residential lots will remain low, due in part, to the drop in oil prices, the large supply of available residential lake lots in the region and the overall slow economic climate. The development of the oil sands projects could drastically alter this situation.

[1] The Alberta Tourism study is intended to identify tourism development opportunities for both the private and public sectors. To date, Alberta Tourism acts as a facilitator, but does not develop these facilities nor offer financial incentives to potential developers. Thus, it will be the responsibility of any potential investors to act on any development recommendations for Moore Lake.

# 5. MANAGEMENT GOALS AND OBJECTIVES

# 5. MANAGEMENT GOALS AND OBJECTIVES

## 5.1 Introduction

Lake management goals and objectives have been identified through the review and assessment of the Background Report and discussions with the Planning Committee and the Advisory Council for I.D. #18(S). These attempt to address as many of the planning constraints, issues and concerns as possible and consist of a series of guidelines which must be considered in both the allocation of specific uses and the implmentation of development policies.

## 5.2 Management Goals

1. Moore Lake has been identified as serving the recreational demands of the local and regional population. The development plan must recognize this role and ensure it is maintained and, where possible, improved.
2. The development plan must realize the importance of maintaining or enhancing the quality of the natural environment. The plan will ensure that future development will not result in use levels beyond the lake's physical capacity or in a deterioration of the water quality.
3. Existing land uses are an important factor in future land use planning. The development plan will attempt to maintain the viability and social environment of these developments.
4. The development plan will provide for the optimum use of the lake and the planning area without imposing financial limitations to either the Improvement District or the M.D. of Bonnyville or restricting the general policies governing the use of Crown lands.

## 5.3 Management Objectives

The following objectives were identified to implement the above noted management goals:

1. To encourage orderly and well planned development so that it will not detract from the existing natural environment.
2. To ensure that no future development or existing developments result in contamination of the lake through improperly treated sewage.
3. To ensure that no future development occurs within the area of the west basin.
4. To encourage the development of the east basin for public recreational purposes.
5. To ensure that no future development results in the deterioration of those areas identified as important fish or wildlife habitats.
6. To ensure the protection of Happy Hollow Lake from future development.
7. To conserve those lands in the watershed area where vegetation clearing could result in increased nutrient loading of the surface runoff.

# 6. CONCLUSIONS, ASSESSMENT AND RECOMMENDATIONS

# 6. CONCLUSIONS, ASSESSMENT AND RECOMMENDATIONS

## 6.1 Introduction

The conclusions, assessment and recommendations are based upon the preceding analysis of the physical, biological and socio-economic characteristics of the Moore Lake Planning Area. Each statement provides direction towards establishing future land use allocations and development policies which could be included in the final area structure plan. Two composite maps (Maps 5 and 6) detailing land use development constraints and potential have been prepared.

## 6.2 Conclusions

### 6.2.1 Physiography (Map 5)

(a) Average slopes around Moore Lake are predominantly gentle to undulating (0-10%) and with the exception of the steep banks along the north shoreline (and around Happy Hollow Lake) would not generally restrict development.

(b) The soil properties indicate that the land is generally well suited for residential and recreational development. Specific areas where poor drainage, high water table and unsuitable soil structure would limit development occur in the western, northeastern and eastern sections of the planning area.

(c) Ground water supplies appear to be readily available and according to Alberta Environment would not affect future development opportunities.

(d) Lake levels, although identified by the property owners as fluctuating abnormally, appear to respond more to beaver dams and precipitation than to recreational, residential or resource development.

(e) The area is considered to have a high potential in terms of archaeological and historical sites and according to Alberta Culture should be protected.

### 6.2.2 Bio-physical

(a) Moore Lake is not considered to be key habitat area for wildlife. The lack of significant areas of wetlands or shoreline vegetation, the lack of a diverse topography and poor soil fertility greatly reduces the areas available for feeding and production.

(b) Moore Lake is not considered to be a significant sport fishing lake. Major fish habitat areas occur around Doris Island and along the north shore of the west basin. These areas contain important emergent and submergent aquatic vegetation growths. Overall, however, a lack of significant areas of shoreline aquatic vegetation greatly reduces spawning and feeding habitats. Those that do exist along the northwestern shoreline must be protected.

(c) The large surface area of Moore Lake and its overall depth have resulted in the lake being classified meo-eutrophic or having good water quality. Nutrient loading of the lake has not been significant enough to cause excessive algae or other aquatic plant growth (which results in lake eutrophication or oxygen depletion). The lake, however, has a very slow flushing period and water entering the lake (primarily through the watershed) remains in the lake for an abnormally long period of time.

(d) The watershed is very important to the overall capability of the lake to support future development. Approximately eighty percent of the lake's annual inflow results from surface runoff and drainage has a major impact on the water quality. The drainage pattern is primarily from a southeasterly direction and disruption along the north shore could have a major impact on the nutrient and sediment levels in the surface run-off.

(e) The overall size, configuration and depth of the lake is conducive to recreational activities. Only the shallow areas within the west basin and around Doris Island would restrict boating or water skiing, (refer to Map 3).

### 6.2.3 Socio-Economics

(a) The questionnaire results indicated that the problems of uncontrolled development and the concern over water quality are the principle planning issues of the property owners.

(b) Field research and input from the Planning Committee indicated that lake use by other than existing property owners is very high. This is due to the availability of public recreation facilities.

(c) Calculations of the lake's development capacity indicates that it is currently well developed and depending on the type and location of future development could be overdeveloped.

(d) Calculations of the boating capacity indicates that the lake is currently well developed and that boat congestion and interference with the existing fish and wildlife habitats is very high.

(e) Approximately 75% of the land within the planning area is Crown Land, managed by Alberta Forestry, Lands and Wildlife. Use of this land is provided through dispositions issued by the Provincial Government. Private development of Crown Land is required to receive development approval of the Improvement District.

(f) Esso Resources Canada Ltd. and Husky Oil have oil sand leases for all land in the planning area (as well as petroleum and natural gas leases). At present there is no resource development but some potential for exploration, drilling and well production does exist.

(g) The demand for public recreational use of the lake and the overall demand for recreational areas in Alberta has put considerable pressure on the Improvement District, the M.D. of Bonnyville and the Province of Alberta to permit increased development on Moore Lake.

(h) Existing public access to the lake is minimal. A single government road allowance from Highway 55 provides limited access to all development on the Lake. Secondary Road 892 runs parallel to the eastern shoreline but no private or public roads have been built to the lake.

(i) Current municipal plans, policies and regulations prohibit future multi-lot residential subdivisions but do allow intensive and passive recreational activities.

## 6.3 Assessment

Overall, Moore Lake does not appear capable of supporting future recreational or residential development and the large number of vacant lots will greatly restrict any future development proposals. No future residential development should be permitted until such time as all existing lots have been developed. Existing recreational facilities on Moore Lake are currently well used and should future recreational areas be required they should locate within the eastern basin. In this area, only passive recreational activities should be permitted. Maps 3 and 6 identifies those areas which could provide future recreatonal opportunities.

Based upon this statement, the following assessment of the lake's development capabilities are provided:

(a) Areas of poor soil drainage, high water table and fast/slow percolation rates have severe development limitations. The potential for ground water, watershed and lake contamination from erosion or improperly treated sewage is very high in these areas.

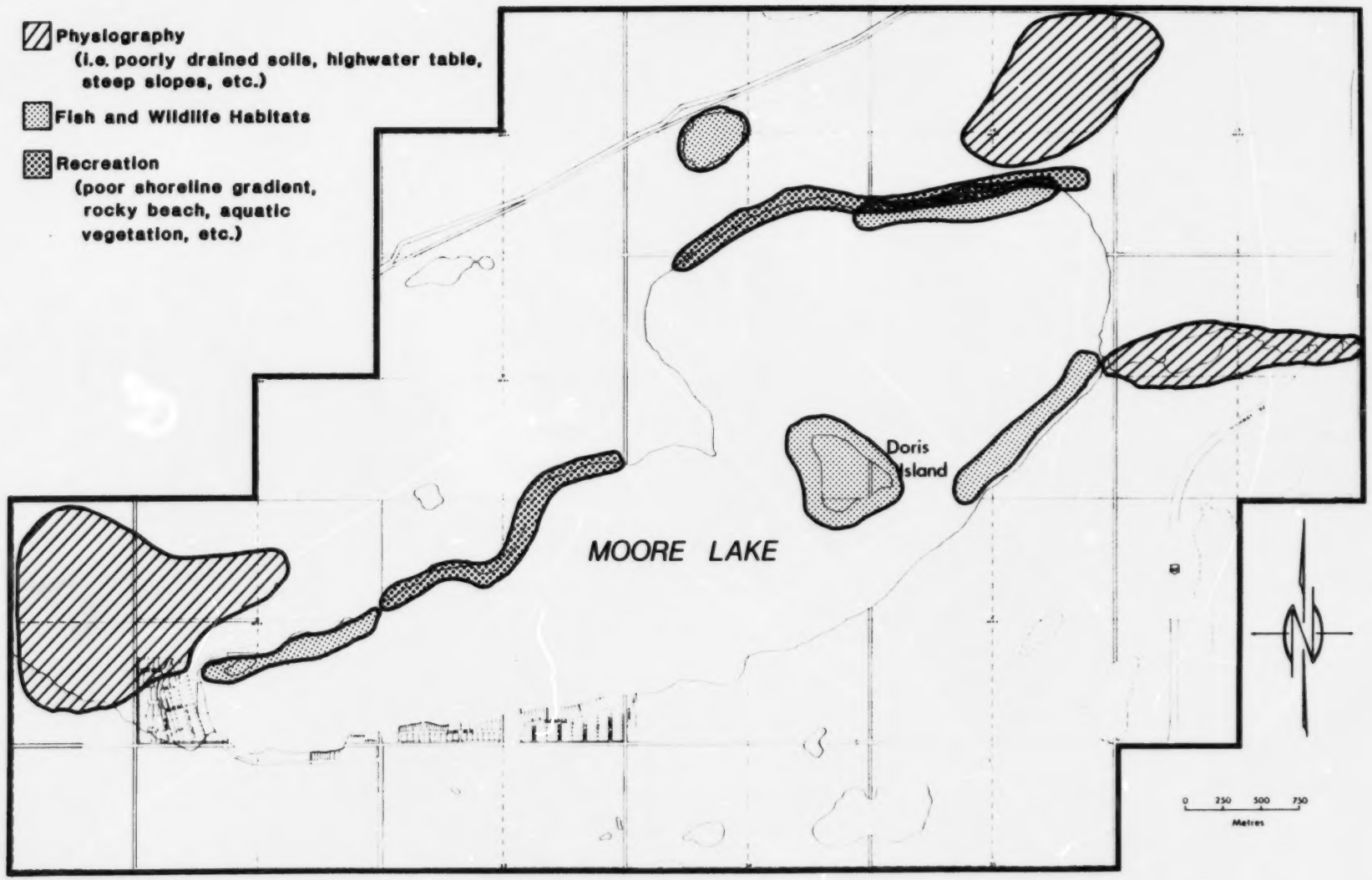
(b) Areas of steep slope and rolling topography require protection against future development. The potential for water contamination from uncontrolled erosion along these shorelines is very high. Increased nutrient loading through runoff could cause excessive aquatic vegetation growth and result in eutrophication (oxygen depletion).

(c) According to Alberta Environment groundwater supplies and potability should be adequate to support future development, however, site specific analysis are necessary for each new proposal.

(d) According to Esso Resources, Husky Oil and Petro-Canada no lake water would be used to serve any resource development projects. Lake water levels will, therefore, be dependent upon beaver dams and annual rainfall.

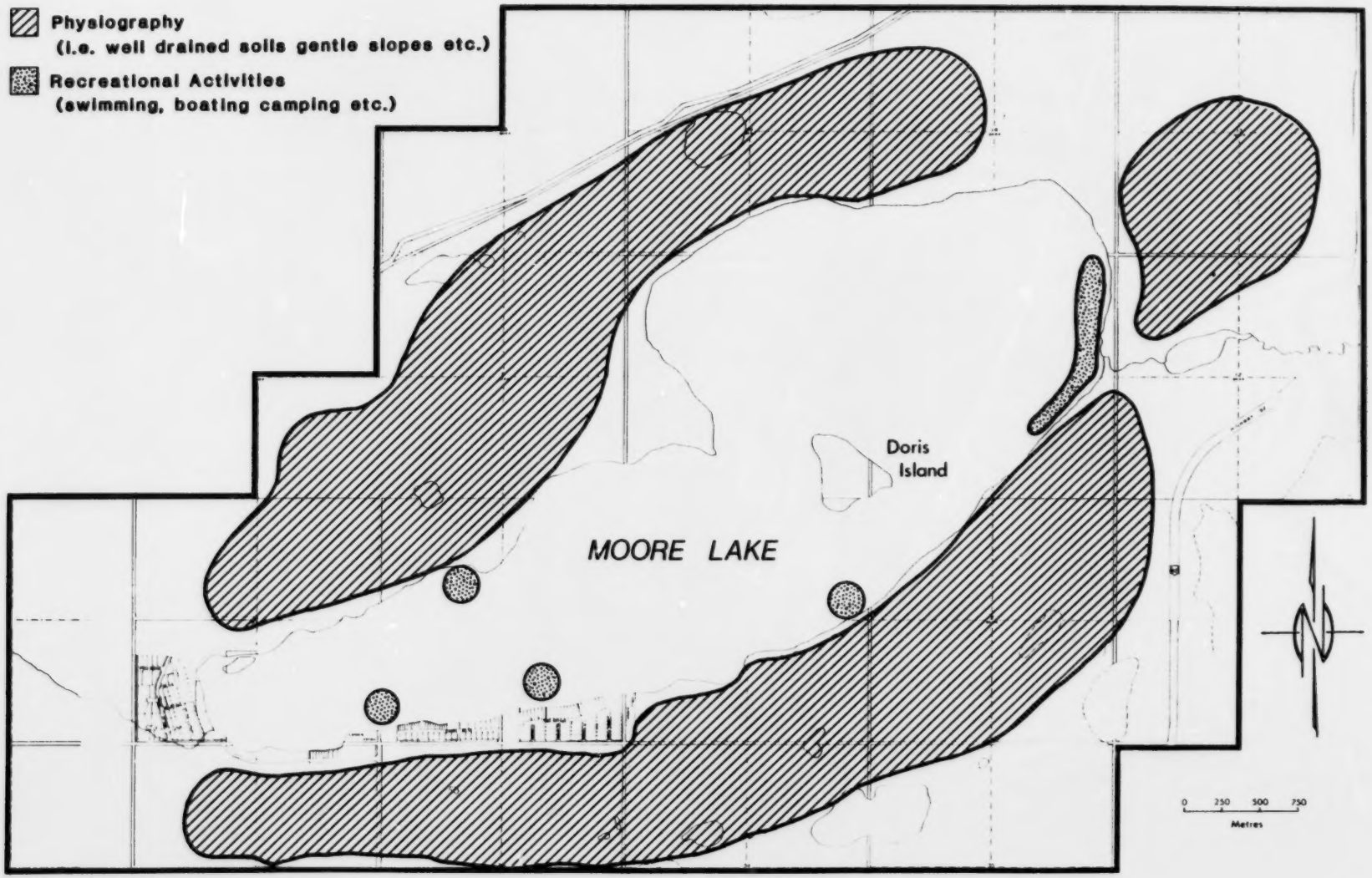
## Map 5

## SIGNIFICANT DEVELOPMENT CONSTRAINTS



## Map 6

# DEVELOPMENT POTENTIAL



(e) It is important to protect and if possible, enhance existing fish habitats. These are very susceptible to excessive nutrient loading and shoreline sedimentation caused by shoreline erosion or congested boating activities. The areas of significant aquatic vegetation growths require protection to ensure that future shoreline development does not result in deterioration of these critical habitats. Important in this regard is the north shore of the west basin and the area around Doris Island.

(f) The slow flushing period of Moore Lake plays a very important role in determining the development capacity. Increased nutrient loading caused by land clearing or improperly treated sewage could result in serious deterioration of the lake water quality. The assessment suggests that increased residential development on Moore Lake could result in decreasing the overall water quality. Development along the north shore should be restricted and land clearing elsewhere kept to a minimum. Developments requiring a sewage disposal system should be monitored and prohibited along the shoreline to prevent possible contamination.

(g) The potential effects of future development on wildlife is considered to be minimal. The existing habitat areas are considered marginal and most development would not result in the destruction of any key wildlife populations. Increased public access and development will, however, result in some conflicts with normal wildlife movements.

(h) All development proposals will be constrained by the lack of public roads in the planning area. Access extension is costly and will significantly affect future development. Neither Alberta Transportation nor the municipalities have indicated their willingness to build any new roads to serve the lake. The Lake Management Plan must be sensitive to the monetary constraints of both municipalities.

(i) As 75% of the land in the planning area is Crown Land, co-operation between the Provincial Government and Improvement District is essential to the development plan.

(j) Future resource development by Esso, Husky or Petro-Canada could have an effect on the lake environment. They have, however, indicated their willingness to discuss their development plans and to ensure input from the municipalities.

## 6.4 Recommendations

Based upon the assessment of the lake's development capacity, a number of recommendations have been established that would fulfill the management goals and objectives.

1. No new construction or development should be permitted within 30 m of the lake's high water mark.
2. No development should be permitted on those areas identified on Map 5 as having significant physiographic constraints.
3. Recreational development could locate within those areas identified on Map 6 as having development potential.
4. Development should be prohibited in and immediately adjacent to areas of important fish and wildlife habitats (Maps 4 and 5).
5. Development should be prohibited within the northern watershed of the planning area.
6. No new development should occur unless the developer is willing to provide public access to the proposed site and to the lake itself. Provisions must also be made for the availability of utility and other municipal services.
7. All new development should provide technical information indicating sufficient supplies of ground water.
8. Public access to the lake could be permitted within the areas identified on Map 3 as having recreational potential.

9. All development should locate on parcels large enough to support any required on-site sewage disposal system. These developments should be required to install a sewage disposal system which has been approved by Alberta Labour.
10. Any construction or development along the shoreline would have to be undertaken with minimal vegetation (aquatic or terrestrial) removal.
11. Prior to any future development, an Historical Resources Impact Assessment would be required as per the guidelines established by Alberta Culture.
12. Power boating and water skiing should be prevented in those areas identified on Map 5 as being key fish habitats.
13. Commercial development could be permitted as provided in intensive recreational developments.
14. No intensive agricultural operations should be permitted within the planning area.
15. The municipalities may examine the sewage disposal systems installed in the existing developed residential areas. If the municipality decides that the sewage disposal systems may become injurious or dangerous to public health, the municipality may request the local health unit to investigate such situations with a view to requiring, under the Public Health Act, corrective measures, if necessary. Where any person fails to undertake the prescribed corrective measures, the municiaplity may undertake such measures with the costs incurred to be collected in like manner as municipal taxes.
16. Any future development or structures (except for removable domestic piers or removable boat lifts) proposed on the shoreline reserve or lake bed shall be required to obtain authorization from Alberta Energy and Natural Resources (if on the lake bed) and/or a development permit from the municipality (if on the shoreline reserve).
17. Alterations to the bed and shores of Moore Lake shall not be undertaken without the necessary authorization and permits from the appropriate government agencies.
18. Doris Island shall remain in its present natural state.
19. The municipalities, upon request from area residents, may apply to the Alberta Boating Regulation Review Committee for the imposition of appropriate boating regulations in specific locations of the lake.
20. Upon receiving the approvals from the Alberta Boating Regulation Review Committee, the municipality shall post and maintain signs in appropriate locations informing the public of the boating regulations.
21. The municipality, were possible, shall require new boat launching facilities to be located elsewhere from public swimming areas.
22. The municipalities shall encourage lot owners to establish a cottage owners association.

# 7. DEVELOPMENT PLAN

# 7. DEVELOPMENT PLAN

## 7.1 Introduction

Based upon the assessment of development constraints and capacities, the management goals and objectives and the final recommendations, it is possible to identify a single development strategy for Moore Lake. Through a series of discussions with the planning committee and affected government agencies, an overall land use development plan evolved. This plan will be used as the framework for the preparation of general and site specific land use and development policies that would eventually be adopted and enforced as the Moore Lake Area Structure Plan.

This development plan was prepared by combining the following into a single land use plan (Map 7):

- existing land uses;
- areas of limited development potential (Map 5);
- areas of development opportunities (Map 6);
- management goals and objectives;
- future demand for recreational activities; and the
- questionnaire results.

These land use designations, however, are not the only possible development strategy for Moore Lake. Each statement could be altered or deleted, or either the M.D. of Bonnyville or the Improvement District could include new strategies or land uses. A final decision will be made by the Improvement District and the M.D., after the public has had an opportunity to review the plan and provided their input and recommendations.

The development plan consists of a set of proposed land use areas. The particular philosophy utilized in identifying each land use allocation is discussed below:

## 7.2 Rural Conservation Area

The objective of this area is to identify those sites with marginal development capabilities. The emphasis is placed on existing uses which maintain the natural features of the lake environment.

Most of the land included in this district is Crown Land and it is recommended that no leases be issued which would result in any intensive recreational or residential development.

Future development could be permitted providing the proposal would not result in any deterioration of the lake environment or its shoreline and the Improvement District or the M.D. of Bonnyville were willing to amend the plan.

USES: – agriculture;
– resource development;
– farmstead/country residential;

## 7.3 Residential Area

The objective of this area is to identify those sites currently developed for residential purposes and includes only registered subdivisions. Resubdivision of existing lots would be permitted provided it meets the development standards of the Land Use Order or Bylaw.

USES:
- single family dwellings;
- public recreation facilities (within municipal reserves).

## 7.4 Recreation Area

The objective of this area is to recognize existing recreational developments. The emphasis is placed upon intensive public-oriented recreational land uses and permits the expansion of existing facilities.

USES:
- campgrounds (public);
- playgrounds;
- boat launching facilities (including a parking lot);
- concessions.

## 7.5 Recreation Conservation Area

The object of this area is to identify generally undisturbed lands which have moderate to marginal development capabilities. The emphasis is placed on passive recreation uses that would have minimal environmental impact. No permanent developments would be permitted.

USES:
- activities such as walking/skiing;
- cenic observation areas;
- hiking and low intensity day use activities.

## 7.6 Resort Commercial

The object of this area is to recognize existing private recreation areas and provide the opportunity for controlled expansion. The emphasis is placed on high density, public-oriented recreation uses and includes facilities for food and rental services.

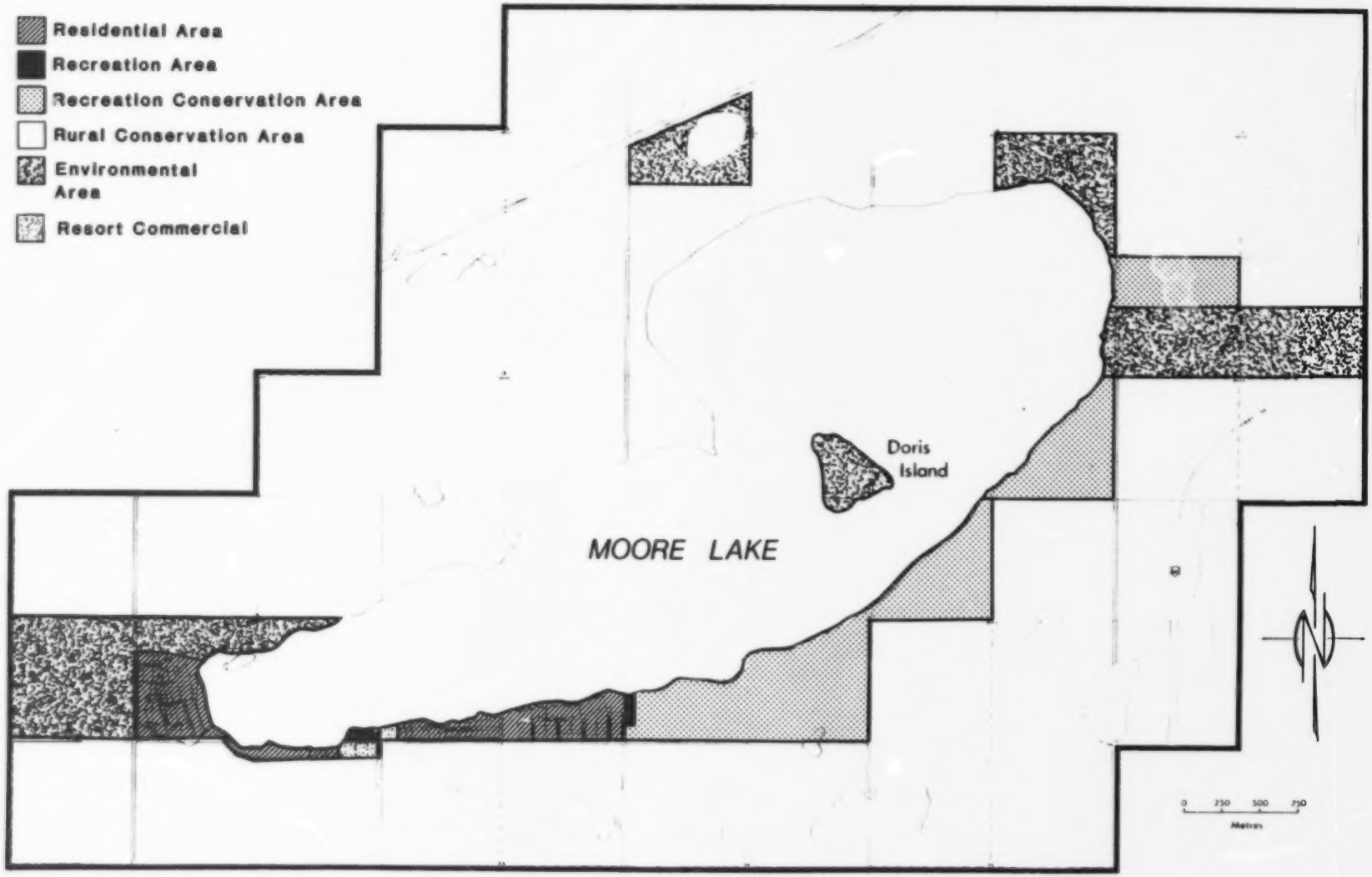
USES:
- facilities and development associated with food services, groceries/equipment supplies and rental accommodations;
- private campgrounds;
- marinas.

## 7.7 Environmental Protection Area

The object of this area is to protect those sites which have severe development limitations. The emphasis is placed on restricting activities which may have a negative impact on the surrounding environment. Sensitive fish habitats, significant areas of shoreline aquatic growth, poor soil and topographic characteristics and areas important to the watershed are included in this designation. Only existing uses may be permitted.

Map 7

# DEVELOPMENT PLAN



# 8. APPENDICES

# 8. APPENDICES

## 8.1 APPENDIX A
### Occupancy Rates

1. Summer Use = May 15 – September 15
2. Provincial Parks average use

   May – weekday = 22%
   – weekend = 56%

   July – weekday = 38%
   – weekend = 68%

3. The calculations utilized throughout the user days assessment assume 100% occupancy.

## 8.2 APPENDIX B
### User Statistics

1. Residential Subdivision

   Total number of registered lots = 180
   Total number of developed lots = 70

   peak weekend use is 3.3 persons/dwelling

   Therefore the average number of users during peak periods would be:
   3.3 x 70 = 231 users
   3.3 x 180 = 594 potential users

2. Lake Use By Property Owners

   Total number of property owners in the planning area outside registered subdivisions = 9

   peak weekend use is 3.3 persons/dwelling

   Therefore the average number of users during peak periods would be:
   3.3 x 9 = 29.7 total users.

3. Private Campground Use

   Total number of cabins and campground sites = 37

   peak weekend use is 3.3 persons/cabin

   Therefore the average number of users during peak periods would be:
   3.3 x 37 = 122 total users.
   3.3 x 52 = 171.6 potential users

4. Public Campground Use

   Total number of unserviced sites for both campgrounds = 60 users.

   peak weekend use is 3.3 persons/site

   Therefore the average number of users during peak periods would be:
   3.3 x 60 = 198 users.

5. Use Densities

   (a) Present use levels on long weekends at peak use = 581 people. The lake surface area is 986 ha. Therefore 986÷528 = 1.7 ha/user.

   (b) Projected use levels (including full development of vacant subdivision lots) = 993 people. Therefore 986÷993 = 1 ha/user.

   (c) Existing Use Densities:
   - existing number of developed lots = 70
   - rental recreation units = 37
   - provincial campground units = 60
   - property owners = 9

   TOTAL = 176 recreation/residential units
   Lake Surface Area = 986 ha

   Therefore 986 ÷ 176 = 5.6 ha/recreation/residential units.

   (d) Potential Use Densities:
   - potential number of developed lots = 180
   - rental recreation units = 52
   - provincial campground units = 60
   - property owners = 9

   TOTAL = 301 recreation/residential units
   Lake Surface Area = 986 ha

   Therefore 986÷301 = 3.27 ha/recreational/residential unit

Considering existing and potential use densities it is believed that Moore Lake is rapidly approaching an overcrowding situation.

## 8.3 APPENDIX C
### Boat Use

To estimate the number of boats on Moore Lake, the following assumptions were made from analysis of the property owner survey, field research and information supplied by the Planning Committee.

(a) The land owner survey indicated that seventy two percent of the respondents owned and operated a boat on Moore Lake. The total number of boats owned by the 78 respondents is 56 which gives an average of .7 boats per lot. Total potential boat use, should all 180 registered lots be developed, would be 126 boats.

(b) It is assumed by Alberta Recreation and Parks that 25% of the day use/camping parties at either of the provincial parks or the rental sites, will operate a boat. In this case, with 60 public sites and 37 private sites, approximately 24 will contain a boat.

(c) It is assumed that the agricultural land owners will operate 3 boats.

(d) It is assumed that most of the boats on Moore Lake will be motor boats. Field research and input from the Planning Committee and Alberta Recreation and Parks indicated that other types of boats (ie.) sailboats, canoes, etc are rarely used. The land owner survey indicated 86% of the respondents operated a motorboat.

TOTAL – 83 boats assumed available for use on Moore Lake during peak weekend periods. Considering the available lake surface to be 828 ha, each boat has approximately 10 ha of lake surface area. This figure changes dramatically when the number of potential boats from the unsubdivided lots are added. Approximately 5.27 ha. of lake surface would be available. Considering the 20% utilization level, Moore Lake should be able to accommodate additional boating use.

(e) Boat Density Carrying Capacity
- Lake surface area available for boating = 828 ha
- Lake surface capacity for boating @ 4 ha per boat = 207 boats
- Number of boats at existing level of development = 83 boats
  Percent boat capacity = 41%
- Potential number of boats = 157
  Percent boating capacity = 78%

(f) Potential Boat Use
- Registered subdivision lots = 180 lots
- Potential boats – 180 x .7 = 126 boats
- Potential Cabins/Campsites = 52
  Potential boats = 47 x .25 = 13
- Provincial Park Sites = 60
  Boats – 60 x .25 = 16
- Other = 3

Total Potential Use = 157 Boats